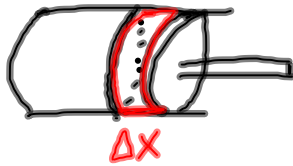


12.



$$F = pA$$

$$a) \Delta W = F \cdot \Delta x = pA \Delta x$$

$$\Delta W = p \Delta V$$

$$W \approx \sum p \Delta V$$

$$W = \lim_{\Delta V \rightarrow 0} \sum p \Delta V$$

$$\text{show } W = \int_{(p_1, V_1)}^{(p_2, V_2)} p \, dV = \int_{V_1}^{V_2} p \, dV$$

$$b \int_{243}^{32} p \, dV$$

∴ need p in terms of V

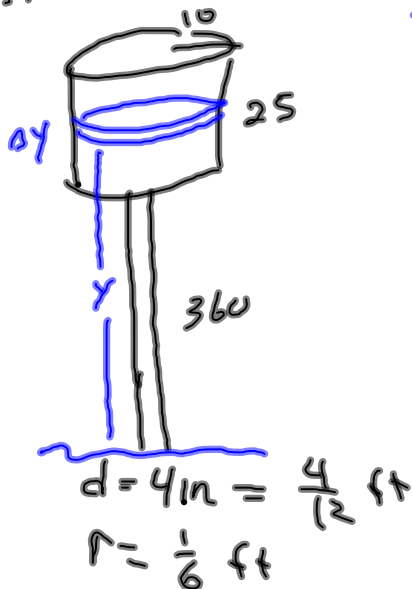
$$pV^{1.4} = k \quad p = \frac{k}{V^{1.4}}$$

$$50 \cdot 243^{1.4} = k$$

$$\int_{243}^{32} \frac{50 \cdot 243^{1.4}}{V^{1.4}} \, dV$$

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24.



$$\Delta W = \text{weight} \cdot y = 62.4 \frac{\text{lb}}{\text{ft}^3} \cdot \Delta V \cdot y$$

$$\Delta W = 62.4 \pi \cdot 10^2 \cdot \Delta y \cdot y = 100\pi 62.4 y \Delta y$$

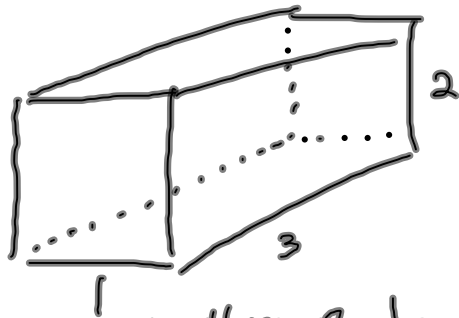
$$W_T = \int_{360}^{385} 100\pi 62.4 y \, dy$$

$$W_p = \int_0^{360} \left(\frac{1}{6}\right)^2 \pi 62.4 y \, dy$$

$$\frac{(W_T + W_p) \text{ ft} \cdot \text{lbs}}{1650 \text{ ft} \cdot 165 \cdot 360 \text{ s}}$$

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7.5 b Fluid Pressure



Force on bottom of tank

$$p = 62.4 \frac{\text{lb}}{\text{ft}^3} \cdot 2 \text{ ft}$$

$$F = \underbrace{62.4 \cdot 2}_{p} \frac{\text{lb}}{\text{ft}^2} \cdot \underbrace{3}_{A} \text{ ft}^2$$

$$= 374.4 \text{ lbs}$$

filled with water

p = pressure

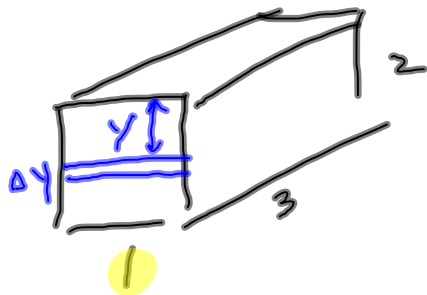
h = depth

$$\checkmark p = \underline{w \cdot h}$$

w = weight density
for water $w = 62.4 \frac{\text{lb}}{\text{ft}^3}$

$$F = \underline{p} \cdot \underline{A} \text{ if } p \text{ constant}$$

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Force on front end

$$F = \int_0^2 62.4 y \, dy = 124.8 \text{ lbs}$$

$$\Delta F = p \Delta A$$

$$= w \cdot h \Delta A$$

$$= 62.4 y \cdot 1 \Delta y$$

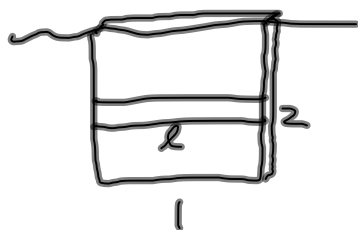
force on the strip

Force on side

$$\int_0^2 62.4 y \cdot 3 \, dy$$

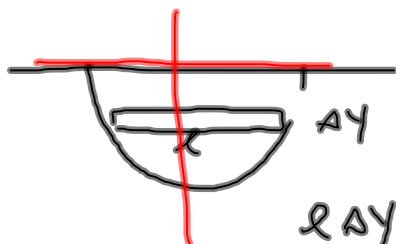
$$= 374.4 \text{ lbs}$$

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submerge

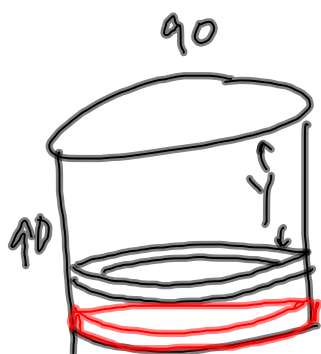
do same as tank prob.



$$r \Delta y = \Delta A$$

r is a function of y

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$$\begin{aligned} \Delta F &= \rho \Delta A \cdot y \\ &= \rho \cdot y \cdot 2\pi r \Delta y \end{aligned}$$

density of molasses

$$\int_0^{90} 100 y 2\pi 45 dy$$

bottom strip

$$\int_{89}^{90} 100 y 2\pi 45 dy$$

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